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ABSTRACT

Reported is a summary of inservice programs held in North Carolina for implementing the Science Curriculum Improvement Study (SCIS). The workshops were five days in length and dealt with the philosophy of the program, instructional methodology, lesson content, use of materials and organisms, and use of the program for environmental education and for correlating instruction in various subject areas. Comments from teacher evaluations are included. Over 130 schools and 600 teachers were involved. (RH)

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THE SCIENCE CURRICULUM IMPROVEMENT STUDY : (SCIS) WORKS IN N. C.

A Paper Presented at
The National Science Teachers Association
Southeastern Area Convention

Norfolk, Virginia
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by

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THE SCIENCE CURRICULUM IMPROVEMENT STUDY
(SCIS) WORKS IN N. C.

The Division of Science Education has as its primary mission the promulgation of scientific literacy, which is also one of the continuing objectives of the State Education Agency. The objective is stated thusly: "All students in North Carolina leaving elementary-secondary schools will demonstrate scientific literacy." Briefly, this means that students, upon leaving school, should be able to use science concepts, process skills, and values in making everyday decisions as they interact with other people and with their environment. To promote scientific literacy, the Division of Science Education has attempted to assess the status of science education in North Carolina and establish priority areas in which to exert major effort during the next few years. From test results and frequent observation made by the Division of Science Education, it was determined that elementary science instruction is the weakest link in the state science curriculum. Most elementary science programs in our state have been textbook-oriented. In realization of the above, the Division of Science Education was led to select elementary science instruction as a priority area.

During the spring of 1971, a decision was made to use the SCIS (Science Curriculum Improvement Study) program as a means for improving science instruction in a number of schools throughout North Carolina. This is also a strategy for teaching children basic environmental concepts. This project included the training of elementary teachers, principals, supervisors, and college personnel in the use of the Science Curriculum Improvement Study material. This national curriculum project, SCIS, designed for use in first six levels (grades) of elementary school, was selected because:

1. it had undergone research and development cycles,
2. the program follows modern trends in instruction toward active involvement of students in scientific processes and experiments leading to concept development in life and physical science,
3. materials to implement the program were available,
4. the National Academy of Science has stated that of the three major elementary curriculum projects (ESS, SAPA, SCIS), "SCIS is the most promising for environmental education because it centers attention on ecological and biological questions.

Also, it is unique in providing a variety of living organisms for classroom demonstrations and experiments as a part of a complete elementary science course,"

5. it is not textbook-oriented--includes teachers' guides and student materials.

Invitation to Participate

Invitations to participate in the project were sent to school administrative units during the spring of 1971, 1972, and 1973, stating that the Division of Science Education would train teachers in a five-day workshop in the philosophy and use of the SCIS program.

Training took place on college campuses and in facilities in local administrative units during the summer months. An acceptance by a school system to participate necessitated an agreement to purchase materials to implement the program the following school year.

State and federal funds were used to cover expenses for food, travel, and lodging of the participants. One unit of certificate renewal credit was awarded to each teacher who participated in a week-long workshop. The involvement by school units as of September 1973 is given in Table I (North Carolina has 151 administrative units).

TABLE I

Workshop Participation For 1971, 1972, 1973

1.	School units participating	48
2.	Schools participating	130
3.	Number of workshops	13
4.	Teachers trained	607
5.	Principals trained	24
6.	Supervisors trained	4
7.	College personnel	14

Summer Workshops

Teacher objectives of the five-day workshops were:

1. To understand the philosophy of the program.
2. To understand the methodology for teaching SCIS (not traditional).

3. To understand the lesson content at one level.
4. To understand how to use, maintain, and replace the materials and organisms used in the program.
5. To understand: how the program can be correlated with all subject areas; how basic environmental concepts are presented in the program; and how teachers can expand these concepts.

An attitudinal survey was taken at the end of the workshops. The results revealed that 95% of the participants felt the objectives were adequately met.

Nature of the Workshops

The workshops were conducted in a very informal manner, although highly structural in organization. Success education philosophy permeated the workshops. Teachers taught themselves and fellow teachers by studying, preparing materials, and presenting the lessons to fellow teachers--role playing as students. There was much teacher interaction. Most the workday was used by teachers studying and presenting program material at the levels which they would be using during the coming school year. Environmental awareness was emphasized throughout the week.

Teachers went on an object hunt field trip during the morning of the second day. They were instructed to examine their environment closely and collect ten interesting objects (living or nonliving). Activities of observing properties, grouping, and classifying followed. Items were grouped according to man-made and natural properties; pollutants and nonpollutants; metal, glass, paper, animal, plant, plastic, etc.

"Around the Corner," a SCIS film which depicts elementary students taking a field trip under two extreme conditions was shown. One setting in a wooded area near the school is more or less ideal and contrasts sharply with the other school area which is located in the inner city with only streets and sidewalks available. Yet, successful field trips take place in each setting. After discussing the film, a short paper, "Conducting a SCIS Field Trip," by Maxwell & Berkheimer of Michigan State University, was given to each participant.

Later during the week another field trip was conducted. Pictures of nature were drawn using natural objects and plants. The teachers described their pictures using descriptive words related to their senses and emotions, resulting in a simple poem.

Division-prepared publications were available to each participant. They included:

- Teachers Guide for Environmental Education
- A Guide to Environmental Education Resources
- Environmental Education: Concepts, Activities, Bibliography
- Environmental Education: Problems, Projects & Exercises/Grades 4-10

At the conclusion of the week, teachers had completed 95% of the lessons at their level. Major life science concepts presented for levels one, two, and three were: organism, birth, death, habitat, food web, detritus, growth, development, life cycles, genetic identity, biotic potential, generation, plant and animal metamorphosis, population, food chain, plant eater, animal eater, community, predator-prey. Teachers expressed excitement and enthusiasm about what they were learning through actually handling and setting up experiments with the many organisms which accompany the program.

Major physical science concepts covered included: object, property, material, serial ordering, change, evidence, interaction, evidence of interaction, system, interaction at a distance, subsystem, evaporation, histogram, solution, and variable.

Workshop Evaluation (Summer 1973)

Evaluations on each day's activities were made. The last day's evaluation, covering the whole week, was most informative. General opinion of the total workshop was very favorable with only two out of 219 (.915%) evaluations indicating negative attitudes toward the week's work.

Typical examples of teachers' written opinions of the workshop were "good, great, excellent, wonderful, fantastic, enjoyable, tremendous, worthwhile, very informative, stimulating, exciting, well planned, highly successful."

Other reactions in general were, "I now feel more confident in teaching science," "This workshop was the best and most practical I have ever attended." One teacher wrote, "I never really liked science before, but now I am so excited about it I can't wait to get in a classroom to share with and convey the same feeling to my students."

Teachers were asked to list workshop experiences most beneficial to them. Responses were in eight categories. See table below.

TABLE II

Responses	General Categories
181	1. Performing activities (individual)
42	2. Teacher interaction
38	3. Field trips
33	4. Films
24	5. Observing other levels
23	6. Demonstration lessons
14	7. General session and mini-lectures
3	8. General session on questioning techniques

Obviously, the most beneficial aspect of the workshop was the individual activities (1). Individual activities were performed in small groups by teachers who would be using them with their students during the coming school year. Functions in small groups per level consisted of:

1. Studying teacher guides.
2. Learning mechanics of the "kit." (how to use the kit)
3. Setting up lessons.
4. Experimenting (finding out by themselves).
5. Presenting lessons (how to teach SCIS--methodology and philosophy).
6. Working with fellow teachers.
7. Handling live organisms.
8. Teaching lessons (not just watching--being allowed to do the "doing").
9. Interacting with fellow teachers (teachers teach teachers).

In summary, the active, "hands-on" participation and involvement among teachers was felt to be the most important aspect of the workshop.

The second most important aspect was interaction among teachers (2). Many teachers got to know fellow teachers for the first time as they exchanged ideas, and learned new tricks in various areas of instruction.

At the beginning of the workshop, many of the teachers stated that they did not take students on field trips (3) because they had no place to go or that they did not know what to do while on a field trip. After taking field trips teachers were very enthusiastic about the activities, handout, discussion, and film. One teacher wrote, "For the first time, I am excited and have new insight on making use of the environment to stimulate interest and teach about nature."

Films (4) were a vital part of the workshop. The following SCIS films were used:

1. "Don't Tell Me, I'll Find Out" (all participants)
2. "Around the Corner" (taking field trips--all participants)
3. "What Would Happen If?" (all participants)
4. "Interaction Overview" (Level Two)
5. "Material Objects Overview" (Level One)
6. "How Cold Is Ice?" (Level Three)
7. "Energy and Models" (Level Five)
8. "Relativity" (Level Four)
9. "Observing Liquids" (Level One)
10. "Conservation" (Paiget-Davidson Films--optional)

Teachers felt the films contributed much to their understanding of the program. Films for specific levels were not viewed by teachers until they had finished teaching the lessons discussed in the film. Teachers felt "Conservation," the film discussing the psychological foundations for SCIS, was most important to view and understand. Although this film was optional and not made available for viewing until Thursday of the workweek, most teachers took time to schedule a viewing.

Teachers were given time to visit and observe other levels (5). It is important that teachers have a general understanding of the concepts and activities at levels below and above the level which they will be teaching.

Demonstration lessons (6) by each level were scheduled for teacher observation and participation. Also, a demo lesson at a nearby school with level one students was presented by a teacher trained in SCIS.

General sessions (7) of 30 minutes or less were scheduled at the first of each morning and last in the afternoon. Discussions and mini-lectures were held on concept teaching, questioning techniques, classification, the learning cycle, teacher's role, process concepts, evaluation of student progress, team teaching - nongraded -, multiage, multilevel situations, ordering equipment and maintaining organisms, pacing activities, and environmental education.

The session on questioning techniques (8) received the least number of responses as being workshop experiences most beneficial to teachers. A few teachers were not aware of divergent versus convergent questioning techniques and the importance of each in presenting SCIS lessons. Although many teachers knew and used good questioning techniques, they were asked to develop appropriate questions as they presented lessons. To practice questioning techniques, the film, "Don't Tell Me," was shown and stopped whenever questions were asked. Teachers responded to the question: "Why would you ask this question?" Each question was discussed thoroughly. It was felt by most teachers that this activity was a good learning situation.

Final Teacher Questionnaire and Results

The following questionnaire was given to all teachers attending follow-up meetings in the spring of 1972 and 1973. All respondents had attended a summer workshop and had almost completed one year of teaching SCIS. The results are given in percentage per item with typical comments following:

Participants Responding/Item

214 1. What is your overall reaction to the SCIS program?
58.9 Very Favorable 38.3 Favorable 1.4 Neutral
1.4 Unfavorable

Other Comments:

- Children really love this--are never bored.
- I really feel that the first grade is getting science.
- It gets away from the textbook approach and provides the slower students a chance to respond orally through experimentations.
- Things are available without having to spend time in finding them.
- It made me more conscious of the resources in my immediate environment.
- The children have really enjoyed it. It has brought responses from those who just "sit." The nonreaders can become involved.
- All children can feel successful and take part.

216 2. Do you feel your science program has been improved as a result of using the SCIS program? 88.8 Yes 7.9 Maybe 3.2 No

Other Comments:

- I no longer dread science and wonder what to do.
- The attention span of the children has increased tremendously.
- Children's interest is greater and they enjoy it more.
- Definitely, I really didn't care too much for science before SCIS--now I love it.
- All subject areas have improved.

215 3. Do you feel your competency in teaching science has improved by using the SCIS program? 82.8 Yes 11.2 Maybe 6.0 No

Other Comments:

- I feel more competent with suitable materials. (2)
- I am more able to correlate other subject matter into science.
- Yes, I have. I am learning along with the children.
- I always put off science because I didn't feel competent. Now it's fun for me.

213 4. Do you feel SCIS has had a positive carry-over to other subject areas? 84.5 Yes 13.1 Maybe 2.4 No

Other Comments:

- Every area, especially math.
- Language vocabulary development. (12)
- Helps the children to start thinking on their own. (2)
- SCIS can be correlated with all subjects. (3)
- Learn words--used in environment.

210 5. If the decision to continue to use SCIS was all yours, would you use it next year? 95.2 Yes .3 Maybe 4.5 No

Other Comments:

- I feel I can bring in more supplementary materials next year.
- Children more inquisitive about exploring and discovering.
- I'm very much in favor of the program; I think it is great.
- Encourage all levels in my school to use the same.
- I feel I have been through it once and my mistakes have taught me things to make the program better.

214 6. Would you recommend the SCIS program to other teachers? 90.7 Yes 7.5 Maybe 1.8 No

Other Comments:

- If they were willing to really do it.
- Science takes on a new meaning when you teach SCIS.
- Kits are very hard to use without training--one teacher coming from a system cannot go back and explain to other teachers.
- It would give them much more confidence and make science for all little children fun.
- There is a definite need for all children to feel successful in some subject--SCIS is the answer.

203 7. Do you feel the summer workshop was essential in giving you the SCIS philosophy and minimum basic training to use the material? 93.6 Yes 3.9 Maybe 2.5 No

Other Comments:

- I would disapprove of any teacher using the material without having some kind of training in the use of the kits.
- If I had not had the workshop, I'm afraid I would have done too much talking myself and not let the children express themselves enough.
- Couldn't have used the materials successfully without the summer workshop. (5)
- I learned many things at the workshop that I had not understood before, with just my manual and kit to work with. I had never really learned to use things I had.
- Definitely. Absolutely.

195 8. Do you feel that the summer workshop of one week (5 days) is long enough to adequately prepare one to use the program?
81.5 Yes 18.5 No

Other Comments:

- You are able to grasp essential ideas.
- Ten days at least.
- One week too short to really learn how to do a good job. (2)

201 9. Do you feel that the follow-up sessions have been of value to you?
82.6 Yes 17.4 No

Other Comments:

- I have received some ideas and suggestions to help in my situation.
- Learning how others have responded and are handling the program has helped a lot. (5)
- It has helped me to know that others have had failures and successes.
- Exchange of ideas very valuable.

209 10. How do you use the SCIS material? 74.6 Total science program 18.2 State-adopted text supplements SCIS 7.2 SCIS supplements state-adopted text

Other Comments:

- Use state-adopted texts when adaptable to SCIS. Also experiments not in textbooks.
- Supplement with state-adopted text.
- Plus reports, art, other science, films, and lessons of my own. (2)
- SCIS makes state-adopted text become "alive."
- Children have voluntarily done much reading and commenting.

11. What extra activities has SCIS encouraged in your situation?

- Math, excellent for graphs and record keeping. (4)
- Field trips. (15)
- Art. (5)
- Creative writing. (3)
- More outdoor activities for the children.
- Carry-over value to parents.
- More experimentation. (4)
- Field trips--for we found a snake and other interesting bugs, worms, and plants that we studied to further our explorations.
- Setting up a science center, where many of the optional activities were used as suggested in SCIS.
- Planting a garden in our school yard.

12. What suggestions can you give to improve the summer workshop?

- Have workshop two weeks. (2)
- It was fine!
- Every teacher needs to work each experiment in a group, individually.

13. What suggestions can you give to improve the follow-up sessions?

- Just to have local sessions within your own county.
- Instead of follow-up sessions, I think each school should be visited and SCIS lessons observed.
- I really see no need for follow-up sessions. Cancel them.
- I learned a lot of things listening to the mistakes or failures of others. They helped me to realize that others' problems helped me from making the same mistakes.
- Schedule during a regular school day. (3)

14. Briefly describe major classroom problems which you have encountered this year.

- Ordering materials and getting them on time.
- Lack of time. (9)
- Main thing has been live organisms.
- Discipline, children get so excited and with a large group it is difficult to get attention from the students. (2)
- Classroom size and inadequate heating at schools.
- Not enough time and space.

15. Briefly describe what you like best about the SCIS program.

- Interaction and enthusiasm shown by the children. Gave us an opportunity to show off for principal, visitors, and other classes, etc. Parents were very impressed.
- High interest of students. (3)
- Children rush to the science table when they enter the room in the morning and would stay there if we didn't have other things to do.
- All children explore, discover, and achieve.
- Live organisms to observe, rather than read about.
- I like seeing children regardless of what level or ability, respond and see them explore and grow on their own.
- Brings out the best in children.
- I don't feel as though I need to know all the answers as I once thought--or that every question <u>has</u> only one answer.